IN THE UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF TENNESSEE, WESTERN DIVISION

ECIMOS, LLC.	)	
Plaintiff,	)	
v.	)	Case No. 2:15-cv-2726-JPM-cgc
CARRIER CORPORATION,	)	
Defendant.	)	

EXPERT REPORT OF JOSHUA SIEGEL

In accordance with Federal Rule of Civil Procedure 26(a)(2), the following is my written report describing the subject matter areas, background, and opinions about which I expect to testify in the present litigation if called upon to do so.

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II. QUALIFICATIONS AND COMPENSATION

1. I am above the age of 18 years old and the following statements are based on my professional knowledge and personal experience.

2. I am currently employed by DisputeSoft as a Systems Administrator and I.T. Consultant. I have over ten (10) years of experience in IT systems administration, security, software and hardware support. Additionally, I have served as a technical and forensic investigation consultant in various complex litigation matters for approximately six (6) years at DisputeSoft, with a focus on matters involving intellectual property rights.

3. I have a Bachelor's degree in Computer Science and a Certificate in Bioinformatics and Modeling from the Wesleyan University and my true and correct curriculum vitae is attached and incorporated hereto as Attachment 1.

4. I am being compensated at the rate of $250 per hour for the work I have performed on this engagement. My compensation is in no way contingent on the outcome of this matter.

III. SCOPE OF WORK

5. I have been retained by the Carrier Corporation ("Carrier") to provide my software analysis expertise in matter 2:15-cv-02726-JPM-cgc, wherein ECIMOS, LLC ("ECIMOS") alleges copyright violations by Carrier, and to the extent where software is involved, the trade secret misappropriation claims made by Mr. Olita. In paragraph 35 of its Second Amended Complaint ECIMOS alleges that "beginning in 2014, without plaintiff's permission, Carrier began developing its own version of ECI's proprietary testing and processing software based on the ECI APIs and ECI Script files". Also in paragraph 35 ECIMOS alleges that Carrier 'reverse engineered' the ECI software. In paragraph 68 ECIMOS alleges that Carrier, with the help of "one or more third parties," gained "access to the ECI APIs and ECI Script Files utilized by the Auto Test component of the IPCS script interpreter's source code. . ." in violation of the Digital Millennium Copyright Act, 17 U.S.C. 1201(a)(1)(A). In paragraph 73 and 74 ECIMOS alleges that Carrier "unlawfully reproduced, prepared, published and distributed plaintiff's copyrighted work . . ." in violation of the Copyright Act, 17 U.S.C. 106

6. I was engaged by Carrier to review these allegations and determine, based upon a review of the ECI software and the current Carrier software, whether the current Carrier RES software evidences any direct or indirect copying, or any reverse engineering of the ECI software. I was also engaged to review, analyze and respond to Plaintiff's Expert Report, as well as declarations and affidavits from Plaintiff.

IV. MATERIALS REVIEWED

7. In the course of my engagement I have reviewed the following materials:

7.1. I was present at the court ordered physical inspection of Carrier's production lines in Collierville, TN, in March, 2016, which in their final stages now use Carrier's RES software to test products;

7.2. During that inspection, I was given access to review the ECI database formerly used by Carrier in its product testing operations;

7.3. Pursuant to this Court's Agreed Protective Order I have been provided with the ECIMOS ECI software source code ("ECI software") and ECI database schema. I have also been provided with the Carrier software source code ("RES software") and the RES database schema;

7.4. A copy of all materials provided to Mr. Chenault, including the Carrier software source code ("RES software") and the RES database;

7.5. Conversations with J.C. Stewart;

7.6. The Declaration of Mr. Jeremy Fleming on December 21, 2016;

7.7. The sworn testimony of Mr. James Rindin and Mr. Stephen Olita on September 1, 2017;

7.8. The sworn testimony of Mr. J.C. Stewart, Mr. Roy Gunn, and Mr. James Chenault on September 5, 2017;

7.9. The sworn testimony of Mr. Stephen Olita on September 7, 2017;

7.10. The sworn testimony of Jeremy Fleming on September 13, 2017;

7.11. The Expert Report of Mr. James Chenault submitted on September 29, 2017; and

7.12. The affidavits of Mr. Olita, submitted on July 11, 2017 and September 29, 2017.

8. I have relied upon these materials, as well as my education, training and experience, to conduct analyses and reach the opinions detailed in this report with a reasonable degree of professional certainty. I reserve the right to rely upon any additional information or materials that may be provided to me or that are relied upon by any experts or fact witnesses. Should there be any such additional information, materials, or further discovery, I reserve the right to amend my opinions.

V. SUMMARY OF OPINIONS

9. Based on my years of experience in software, hardware, databases, and intellectual property investigations, I did not see any evidence of direct or indirect copying of the ECI software, in particular the ECI APIs and Scripts, in Carrier's RES software as alleged. Plaintiff has not shown that the developer of the RES software, Amtec, had access to its ECI software source code or APIs. Plaintiff has had the opportunity to identify protectable, alleged-infringing elements within the software, but has not identified a single protectable element that directly or indirectly infringes their software. The new RES software was developed by following the principles of clean room design. The structure, sequence, and organization of the RES database is different from the ECI database. The ECI software cannot have been literally copied, as ECI source code is written in Visual Basic 6 ("VB6"), while the Carrier RES software is designed using a visual programming language, LabVIEW's graphical programming language ("G"). Mr. Chenault has not provided enough information for his analysis to be replicated, validated, independently verified, or relied upon. Further, material issues with Mr. Chenault's report throw his database testimony into question. Mr. Chenault did not find that the LabVIEW RES software was being used to "take control" of or otherwise misappropriate the ECI software. In sum, I have still seen no evidence to support Plaintiff's copyright or misappropriation claims.

VI. OPINIONS AND ANALYSIS

A. PLAINTIFF HAS NOT SHOWN THAT THE DEVELOPER OF THE RES SOFTWARE, AMTEC, HAD ACCESS TO ITS ECI SOFTWARE SOURCE CODE.

10. It has yet to be demonstrated that Amtec, the developer of the RES software, had any access to the ECI software source code or APIs. Without access to the source code for the ECIMOS software, or the code for the APIs, it would not be possible for Amtec to misappropriate the ECIMOS software.

i. ACCESS TO THE APIS

11. Mr. Olita in his September 29, 2017 affidavit refers to an email sent to Paula Davis: "Attached to the foregoing email is an Excel spreadsheet that is replete with ECIMOS's valid tests ***which are the copyrighted APIs***." (emphasis added) The spreadsheet is in fact replete with the ***names*** of the valid tests; no source code or any mechanism to execute the valid tests exist in that email attachment spreadsheet. It appears as if Mr. Olita is alleging that the ***names*** of the ECIMOS valid tests ***are*** the copyrighted APIs. This is not an appropriate interpretation, which I will detail below.

12. API stands for Application Programming Interface.[1] An API is the means of accessing internal functions of a program from an external application. By the common definition of API, the names of the API methods would need to be exposed and available to developers for the API to be useful in any way. APIs also will tend to have excellent documentation on how to use and interact with the API.

13. APIs in general usage are a means to connect to public functions of a popular program from a different application. For an example, take the payment processing company Stripe.

[1] https://en.wikipedia.org/wiki/Application_programming_interface, also see Fleming Deposition, p. 26:16-27:4

Stripe has its own program that handles processing of customer payments. Stripe makes certain methods to accept customer payments available to other applications via an Interface. A developer can write their own application which will accept customer payments using the Stripe APIs. This interface to the Stripe program via a new application is the Application Programming Interface or API. The API in this example is a means for a developer to create a new application, but utilize the secure, tried-and-true payment processing of Stripe. This also saves time for the developer, as they do not have to program a new payment processing system, and instead can leverage the Stripe program via its publicly available functions, the APIs. For the Stripe API, extensive documentation is available on how to interact with their API from multiple different programming languages.[2]

14. Mr. Olita does not appear to be using the term API in this standard way. There does not appear to be documentation on how to interface with the 267 APIs, nor do they appear to be intended to be called or used from other external programs, nor does he appear to be offering the APIs to others to use in order to interface with his programs.

15. Further, one of the biggest confusions in this case stems from the constant referral to "APIs and Scripts" by Mr. Olita as opposed to the ***names*** of the APIs and Scripts. A name does not contain the expressive content of an API. A name is merely a label used to identify the section of code to be executed when a function is called from the API. The expressive content would be contained in the source code and programming behind the API function, or in a compiled DLL or executable, not within the name of the API function. To put the issue in context of this case, what matters is not ***that*** the system tests HIPOT voltage, but ***how*** the HIPOT voltage is tested in the source code.

[2] Available at: https://stripe.com/docs/api

16. Returning to the Stripe example, a competitor to Stripe for credit card payment processing is Square. Both Stripe and Square allow creation of a "Customer" object via their respective APIs.[3] Both sets of documentation provide examples on how to interface with the respective program to create a customer. ***How*** the software for Stripe and Square achieve this end goal, however, is not exposed via the API, as the expressive content resides within the respective programs.

17. One last analogy to illustrate the point. Take two musicians, one a pianist, the other, a recorder player. Consider each musician as a program with an API exposing the function "play note(X)," a function to play a given note, "X," on the musical scale. Now imagine a conductor. The conductor in this case represents the application wanting to interface with each musician via their respective APIs. The conductor uses the API to instruct each musician to "play note (A)". Both the pianist and the recorder player will play an A note on their respective instruments, but the mechanism for how each note is actually generated is vastly different. For the piano, a key is struck, causing a hammer to fall upon the appropriate string, generating the sound. For the recorder player, they must expel air into the instrument in a certain way, with specific holes blocked, for the air to properly resonate and generate the correct A note. The name of the API function for both was "play note(X)", but the expression is vastly different. This analogy applies to attempting to gain protection for the names of the APIs as Mr. Olita alleges; it is like trying to receive protection for the idea of playing a musical note.

18. Lastly, in order to incorporate an API from one program into a new application and have the new program work, the API would need to be present or accessible in some fashion to the new program. J.C. Stewart has testified that the developer of the new software, Amtec, was never

[3] Available at: https://stripe.com/docs/api#create_customer; https://docs.connect.squareup.com/articles/processing-recurring-payments-ruby

provided the source code for the ECI software, the APIs, or the database scripts.[4] Neither myself nor Mr. Chenault were able to find any evidence of the presence of the ECIMOS APIs, or any links or references to the ECIMOS APIs, within the RES software. This is a critical point, as even if by some yet unknown means Amtec had access to the ECIMOS APIs, Amtec could not have used them as they are not found in the RES software.

ii. ACCESS TO THE VISUAL BASIC 6 SOURCE CODE

19. Plaintiff himself admitted in his July 11, 2017 affidavit that "Carrier was not given ECI's interpretive source code by ECIMOS." This is still true with regard to the Visual Basic 6 source code for the Windows version of the program at issue in the case. Mr. Olita does mention in his September 29, 2017 affidavit, "While continuing in my search of Carrier's document production, I also discovered 116 separate documents containing ECIMOS's interpretive source code." Mr. Olita does not say that the code he references is the source code at issue in the case. The reason Mr. Olita does not go this far is because the code in the 116 reference documents is not the code in question for this matter. The code Mr. Olita found in the 116 documents appears to be a mixture of compiled and uncompiled code for the DOS version of the ECIMOS software. It is my understanding from J.C. Stewart that the DOS version of ECIMOS software was in use at the Carrier plant prior to an upgrade to Visual Basic 6 and the Windows version of the ECIMOS software. It is further my understanding that only the Windows version, the Visual Basic 6 version of software, is at issue in this case. I describe my reasoning and analysis to reach this conclusion below.

20. I reviewed the 116 files referenced by Mr. Olita. The code contained in the 116 separate documents appears to be from the year 1998 and earlier, based on comments found within the

[4] September 5, 2017 testimony of J.C. Stewart; volume 2, pp. 9:1-12; 12:5-19.

code files. I understand that 1998 would be well prior to any potential licensing language in software provided by ECIMOS.[5] I understand from Mr. Olita's testimony at the September 1, 2017 hearing, that the licensing agreement was not present in the software until the 2004 timeframe.

21. A number of the files are QuickBASIC 4.50 compiler code, which points to the likelihood that the code is for the DOS version of the program. QuickBASIC 4.50 is a compiler used in conjunction with the DOS version of Visual Basic. QuickBASIC compiler version 4.50 is not compatible with Visual Basic 6. It is my understanding that the source code at issue in this matter is the Visual Basic 6 sold to Carrier by ECIMOS, not any DOS version of the ECI software.[6]

22. The style and formatting of the code files in the registered work is different from the style and formatting in the 116 files. In the registered work, the name of a file can be determined from the first several lines of the code within the file, often with the Attribute VB_Name. This is largely true whether the file is a ".bas", ".frm", ".cls", or otherwise. In contrast, for the 116 files the name of the file being reviewed cannot be definitively determined from the context. The file name can be inferred from the comments in some of the files, but for many files the name cannot be determined based on the text contained within the file. This is not true for the Visual Basic 6 code.

23. Lastly, the 116 files contain references to other ".bas" files, which do not exist in the registered work. If the 116 files represented the registered work, the referenced ".bas" files relied upon in the 116 files would need to be present in the registered work for the code to properly

[5] I understand that ECI is the entity that created the software at issue in this case, and ECI is now owned by ECIMOS. The terms ECI and ECIMOS will be used interchangeably in this report to avoid confusion.
[6] http://www.qbasic.net/en/qbasic-downloads/compiler/qbasic-compiler.htm QuickBASIC Compiler Version 4.50 is a compiler for DOS.

execute.

24. All of these major differences between the 116 code files and the registered Visual Basic 6 code strongly suggest that the 116 code files are not the code in question in this case, but rather from an earlier version of the software. Mr. Olita himself does not allege that the 116 files or any subset thereof represent the registered work in whole or in part. Even if Carrier had access to the 116 code files identified by Mr. Olita, there is no evidence that those 116 code files were provided to Amtec, or that Amtec ever had access to any ECI source code. Further, there has been no evidence provided to demonstrate that the DOS version of the ECIMOS software was protected by any licensing agreement.

25. In conclusion, it has not been demonstrated that Amtec, the developer of the RES software, had access to either the APIs and Scripts or the Visual Basic 6 source code for the ECIMOS software. Mr. Olita indicated that 116 source code files were in Carrier's possession, but those files do not appear to be part of the registered work in Visual Basic 6, and were not provided to the RES software developer, Amtec. At most it has been demonstrated that Amtec may have had access to the *names* of what Mr. Olita refers to as the APIs, which Mr. Olita himself admits are not protectable in his hearing testimony.[7] Most importantly, neither Mr. Chenault nor I were able to find any evidence of the presence of the ECMIOS code, APIs or scripts within the new RES software.

B. PLAINTIFF HAS HAD THE OPPORTUNITY TO IDENTIFY ALLEGED-INFRINGING ELEMENTS WITHIN THE SOFTWARE, BUT HAS NOT IDENTIFIED A SINGLE PROTECTABLE DIRECTLY OR INDIRECTLY ALLEGEDLY-INFRINGING ELEMENT.

26. To date Plaintiff has yet to identify a single, protectable directly or indirectly allegedly-infringing element within the software or database. Plaintiff has only listed the names of "API's

[7] September 7, 2017 testimony of Stephen Olita; pp. 105:22-106:10; 121:17-122:2; 124:4-16.

and Scripts," but not pointed to any elements allegedly copied. Plaintiff thus far has only pointed to terms common to the HVAC industry, procedures required to be followed by Carrier, or tests developed jointly between ECIMOS and Carrier to meet Carrier's business needs for quality control.[8] It is my understanding that these commonalities between the ECI and RES software largely fall under the scènes à faire doctrine, as creative expression is limited by the constraints required by the software. I explain why below.

27. The term, "scènes à faire" is French for "scenes that must be done," and is used to describe the elements one must have in the scene setting common to a type of play, book, or novel of a given genre. For example, in a romance novel, there would always be a love interest; in a book on baking cakes there would be recipes containing flour, sugar, and water; for a book about car engines there would be pistons, fuel-injectors, and alternators. These elements that must be present in any book on the topic are considered as part of the scenery or setting of the book; the book could not be written or would be severely deficient without the common elements present. It would be tough to bake a cake without sugar or water; these elements must be present in any book on the given topic area, as they are contained in most cakes. Sugar and water generally would not receive copyright protection in this context, as they do not represent originality in their expression, but rather they are part of the scene setting of baking cakes. That is my understanding of the essence of scènes à faire.

28. In this matter, the only elements Plaintiff has alleged were infringed or misappropriated are terms common to the HVAC industry, procedures required to be followed by Carrier, or tests developed jointly between ECIMOS and Carrier to meet Carrier's business needs for quality control. These elements would be present in any software authored to test Carrier's A/C units for

[8] September 1, 2017 hearing testimony of James Rindin regarding joint development; pp. 130:18-132:8; September 5, 2017 hearing testimony of J.C. Stewart and Roy Gunn regarding HVAC industry terms; volume 1, pp. 112:21-114:4; volume 2, pp. 62:5-13.

quality control; the terms and procedures are dictated by the scene and requirements of Carrier's business. Voltage must be tested, defrost must be done, fans must be tested to be within certain operating ranges. As I described earlier, *how* this is achieved in source code would likely be protectable expression, but the *names* of the tests or the names of the HVAC components would likely not be protected.

29. In order to evaluate whether elements have been copied, or are substantially similar, such elements must be demonstrated or presented for review and evaluation by independent experts. I have reviewed the evidence and I have seen no indicia of copying between the ECI and the RES software products. Further, the only similarities I have seen between the software would likely fall under the scènes à faire doctrine.

C. THE NEW RES SOFTWARE WAS DEVELOPED BY FOLLOWING THE PRINCIPLES OF CLEAN ROOM DESIGN.

30. A "clean room" or "clean room design" approach to programming is a general strategy of software development to avoid contamination of new code with previous knowledge of protected intellectual property. By properly employing a "clean room," developers can avoid potentially infringing upon copyrights or misappropriating trade secrets. Normally, a new third-party consultant or contractor without prior knowledge of copyrighted code or trade secrets is hired to develop the new code. The consultant is generally provided with design documentation on what the program should do, and what the requirements and constraints should be for the software. It is also critical that the third party not be exposed to potentially infringing material while developing the new product.[9]

[9] The idea of "clean room" development as a means of protection against copyright infringement was introduced in the case NEC v. Intel. NEC's "clean room" argument relies heavily on the concept of development WITHOUT access to the registered work. In order to ensure there would be no prior knowledge of the registered work, NEC

31. It is my understanding that Carrier attempted to follow the above-outlined principles of "clean room design" when building its new RES testing software. Carrier hired a third-party developer, Amtec, to develop new code from scratch to meet Carrier business and design requirements. Mr. Fleming states in his September 13, 2017 deposition testimony, as well as in his December 21, 2016 Declaration, that Amtec was never provided with the source code for the ECI software, APIs, or scripts. This is in accord with my understanding from conversations with J.C. Stewart, as well as Mr. Stewart's hearing testimony on September 5, 2017. Mr. Stewart further states that the RES database was created from scratch.[10]

32. Carrier took appropriate steps to ensure that potentially protectable intellectual property was not incorporated into its new RES software, in accordance with the principles of "clean room design." Carrier hired a new third-party developer, Amtec. Carrier did not provide Amtec with any of the source code from the previous ECI software product, shielding the new developer from any potentially protectable intellectual property. Lastly, Amtec and Carrier developed a new database from scratch to hold the results of the new RES program. These actions are all in line with the principles of clean room design.

D. THE STRUCTURE, SEQUENCE, AND ORGANIZATION OF THE RES DATABASE IS DIFFERENT FROM THE ECI DATABASE.

33. Mr. Chenault does not state that there is substantial similarity between the two software databases or the software, as the structure, sequence, and organization of the RES database tables are vastly different from the ECI database. Two major architectural differences are: 1) the RES software runs using only 19 database tables, while the ECI database requires 118 tables to function; and 2) the ECI database does not make use of SQL stored procedures, while the Carrier

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hired an independent engineer to develop code in order to maintain their "clean room." *See Harvard Journal of Law & Technology*, Volume 3, Spring Issue, 1990, p 213.

[10] September 5, 2017 testimony of J.C. Stewart; volume 2, pp. 9:1-12; 12:5-19

RES database utilizes 28 stored procedures to handle most database reading and writing operations.[11] The ECI database only contains and utilizes 3 stored procedures, and it is my understanding from conversations with J.C. Stewart that these 3 stored procedures were created by Carrier, not ECIMOS.

E. THE ECI SOFTWARE CANNOT HAVE BEEN LITERALLY COPIED, AS ECI SOURCE CODE IS WRITTEN IN VISUAL BASIC 6 ("VB6"), WHILE THE CARRIER RES SOFTWARE IS DESIGNED USING A VISUAL PROGRAMMING LANGUAGE, LABVIEW'S GRAPHICAL PROGRAMMING LANGUAGE ("G").

34. It is not possible to directly compare the source code of the ECI software and the RES software. The ECI source code is written in the VB6, while the RES source code is written in G using the LabVIEW software. VB6 is a text-based language; it uses written text to generate windows, tabs, scripts, and other common program elements and functionality. Programs written in G, however, are constructed by combining visual representations of lab components. There is no program text that forms the basis of the functionality, rather a programmer connects virtual "nodes" with virtual "wires," to build a graphical block diagram, and these diagrams are connected via virtual "front panels" and "connector panels". A text-based program cannot be directly compared to a visual program; the comparison would be akin to comparing a book about the Mona Lisa to the Mona Lisa painting.

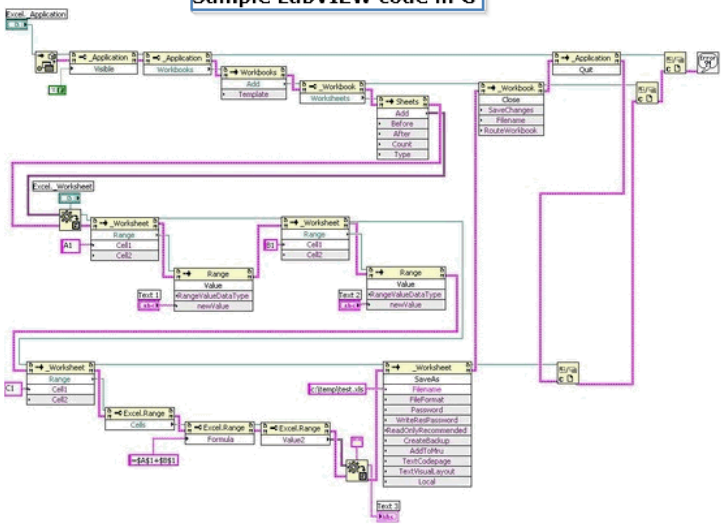
[11] These numbers were generated by searching and adding up the "CREATE TABLE" statements in the database creation scripts for both ECI and RES databases. Stored procedures were manually counted.

35. National Instruments, the creators of LabVIEW and the G language, provides a sample comparison of programs written in Visual Basic versus G on their website. The sample programs take two values, enters them into Excel, adds the values via a formula, and then saves the Excel worksheet to the computer. A picture of the source code for each set of code is included below to illustrate the difference between the languages.[12]

Sample Visual Basic code

```
Private Sub Command1_Click()
'Declare object variables for Microsoft Excel,
'application workbook, and worksheet objects.

Dim xlApp As Excel.Application
Dim xlBook As Excel.Workbook
Dim xlSheet As Excel.Worksheet

'Assign object references to the variables. Use
'Add methods to create new workbook and worksheet
'objects.

Set xlApp = New Excel.Application
Set xlBook = xlApp.Workbooks.Add
Set xlSheet = xlBook.Worksheets.Add

'Assign the values entered in the text boxes to
'Microsoft Excel cells.

xlSheet.Cells(1, 1).Value = Text1.Text
xlSheet.Cells(2, 1).Value = Text2.Text

'Use the Formula method to add the values in
'Microsoft Excel.

xlSheet.Cells(3, 1).Formula = "=R1C1 + R2C1"
Text3.Text = xlSheet.Cells(3, 1)

'Save the Worksheet.

xlSheet.SaveAs "c:\Temp.xls"

'Close the Workbook

xlBook.Close

'Close Microsoft Excel with the Quit method.

xlApp.Quit

'Release the objects.

Set xlApp = Nothing
Set xlBook = Nothing
Set xlSheet = Nothing

End Sub
```

Sample LabVIEW code in G



Visual Basic sample code compared to LabVIEW G code from National Instruments website

36. Despite the fact that literal or direct copying would not be possible from VB6 to LabVIEW, as one is a written language while the other is visual, I still examined the RES

[12] Available at: http://www.ni.com/tutorial/2734/en/

software package for the presence of the ECI API's and scripts. I performed a manual review of the source code files, as well as an indexed full-text search for the names of every ECI API and Script, and I found no evidence of the presence of ECI API's and Scripts in the RES software.

F. MR. CHENAULT HAS NOT PROVIDED ENOUGH INFORMATION FOR HIS ANALYSIS TO BE REPLICATED, VALIDATED, INDEPENDENTLY VERIFIED, OR RELIED UPON.

37. Firstly, as an independent expert, Mr. Chenault has not provided enough information for his analysis to be replicated, validated, or independently verified. This independent verification and validation is a critical element for expert testimony. Even if expert conclusions or reasons for applying analysis techniques may differ, at a minimum one expert should be able to repeat and verify another expert's methodology. Mr. Chenault's written testimony is deficient regarding verification and validation, which I detail below.

38. The SQL queries critical to his conclusions have been omitted from his report. Without understanding what exactly Mr. Chenault did, it is impossible to confirm the validity of his work, or even reproduce the material he presents in sections of his report. Page 16 and most critically page 24 lack details on how the material was provided and what queries were run to create the data used in his comparisons.

39. Mr. Chenault provides no methodology for the creation of a red-and-blue color-coded spreadsheet in his report on pages 25-27. He also provides no information as to the origin or relevance of the blue-and-red spreadsheet data as it pertains to data that actually exists within the RES database tables. The origin of the "Carrier" and "ECMIOS" rows are unclear.

40. Mr. Chenault relies on a Microsoft Excel spreadsheet, cited as "Copy of C013082.xls," as evidence of presence of fields and descriptions in the RES database tables. It is unclear why he would rely upon a spreadsheet included as an attachment to an email, rather than pointing to locations within the RES database and ECI database where the data should be stored and can be

compared. Mr. Chenault had access to both databases, and was able to view them, perhaps with assistance, as evidenced by screenshots earlier in his report. However, no link between the C013082.xls spreadsheet and the actual RES software or database has been demonstrated. Further, it is my understanding from conversations with J.C. Stewart, a Carrier employee with detailed knowledge of the development process of the RES software, that the C013082.xls spreadsheet was not used as a basis for the eventual design of the RES database structure. The C013082.xls spreadsheet was created by querying the ECI database and is not a part of the RES software or database tables.

41. Mr. Chenault has provided no evidence that the descriptions from "Column H" in the blue-and-red spreadsheet relied upon so heavily as evidence of copying on page 32 of Mr. Chenault's report are present in the RES database tables. Mr. Chenault does not indicate the location of the description text in the RES software or database, and I was unable to locate the description data referenced by Mr. Chenault within the 19 RES database tables.

41.1. I searched each of the 19 RES database tables for any fields that looked like the "Description" from Mr. Chenault's report. I found 4 fields containing the word "Description"; the RT_RunTest_Main table contained "TestDescription", the RT_Test_Script table contained "StepDescription", and the RT_Test_Sequence table and RT_User tables contained the field "Description". I used SQL to query all unique values for the data within the 4 fields mentioned above. I was unable to locate any of the Description text from Column H on pages 25-27 of Mr. Chenault's report in those fields, for either Carrier or ECIMOS. I also queried the top 1000 rows of each table as a further sanity check of all table data, in case the description field might have been obviously renamed. I was unable to find anything in the RES database data that looked remotely similar to the data in Column H on pages 25-27 of Mr. Chenault's report.

41.2. It is unclear to me the origin of the "Carrier" side of the "Description" field in his red-and-blue spreadsheet. To reiterate, Mr. Chenault has provided no evidence that the description data from "Column H" cited as a developer comment field data for Carrier is contained in the 19 RES database tables. The unique entries within the 4 RES database table fields that contain the word "Description" are included as Attachment 2. It is clear that the Description from Column H of his spreadsheet does not appear in the RES database tables, but it is unclear what Mr. Chenault relied upon in order to construct the red-and-blue spreadsheet. For this reason, his analysis cannot be independently verified or validated. It is also my understanding that Mr. J.C. Stewart in his own declaration goes into detail regarding other problems with the red-and-blue spreadsheet on pages 25-27 of Mr. Chenault's report.

42. The above issues all relate to validation and verification of methods and data. Additional issues arise regarding the analysis pertaining to Microsoft SQL contained within Mr. Chenault's report. The, errors in Mr. Chenault's report dealing with SQL databases and queries throw the validity of his report into question.

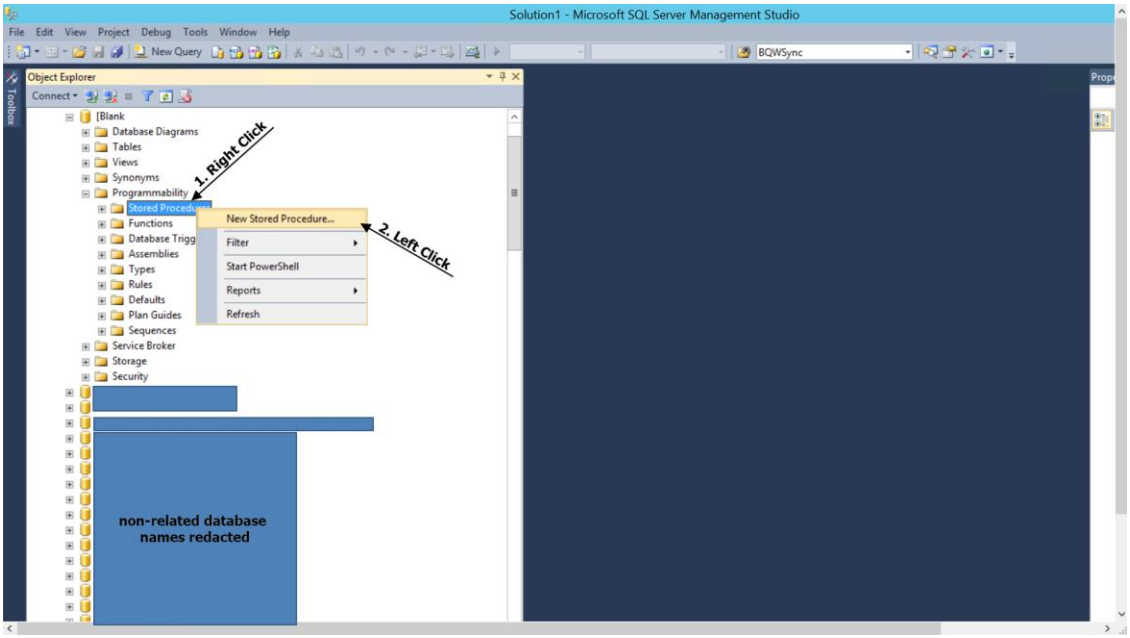
G. MATERIAL ISSUES WITH MR. CHENAULT'S REPORT THROW HIS DATABASE TESTIMONY INTO QUESTION.

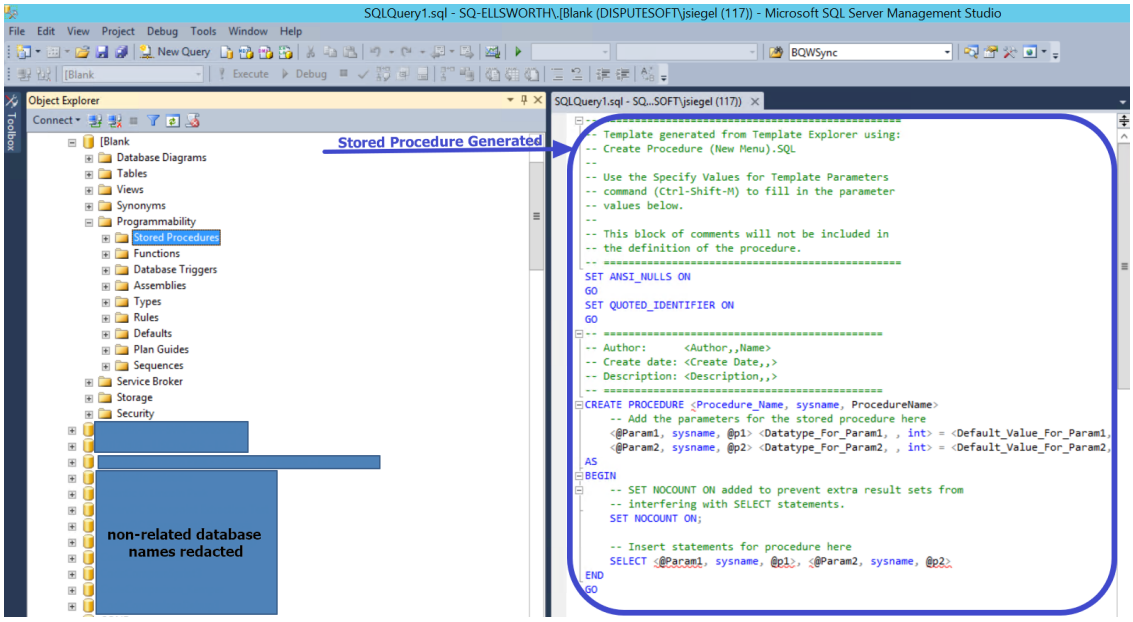
43. Mr. Chenault admits that he is not an SQL or database expert, and yet the majority of his opinions and conclusions rely on analysis and comparisons between the ECI and RES SQL databases. Most of his written testimony deals with database tables and fields. LabVIEW is only discussed in so far as to say that it does not appear to have been used to allegedly pirate the ECI software, APIs, or scripts. In his report, Mr. Chenault relies upon faulty analysis and improper assumptions that undermine any conclusions that he draws in his report.

44. For example, Mr. Chenault relies upon a default stored procedure of automatically-

generated code provide by Microsoft to inappropriately make a point about parameter 1 and parameter 2 on page 9 of his report. That stored procedure in the screenshot is a default stored procedure template. Further, the procedure in the screenshot on page 9 is not found in the RES database stored procedures. I used Microsoft's SQL Server Management Studio ("SSMS") tools to investigate the claim in the RES database.

45. First, I examined the RES database tables and stored procedures, and confirmed that default blank stored procedure is not part of the RES database. The blank stored procedure template is not present in the RES database stored procedures. Secondly, the stored procedure template is not evidence of a malicious attempt to hide or rename parameters. It is a ***default template*** or starting point for creating a blank stored procedure, where one could enter in the arguments (parameters) for the procedure to process. Using SSMS, it is a simple right-click on "Stored Procedures," then a left-click on "New Stored Procedure" to generate this template. I used a blank database to demonstrate the ease of creation and have included two screenshots to illustrate the process below:





Creating a new blank stored procedure in SSMS

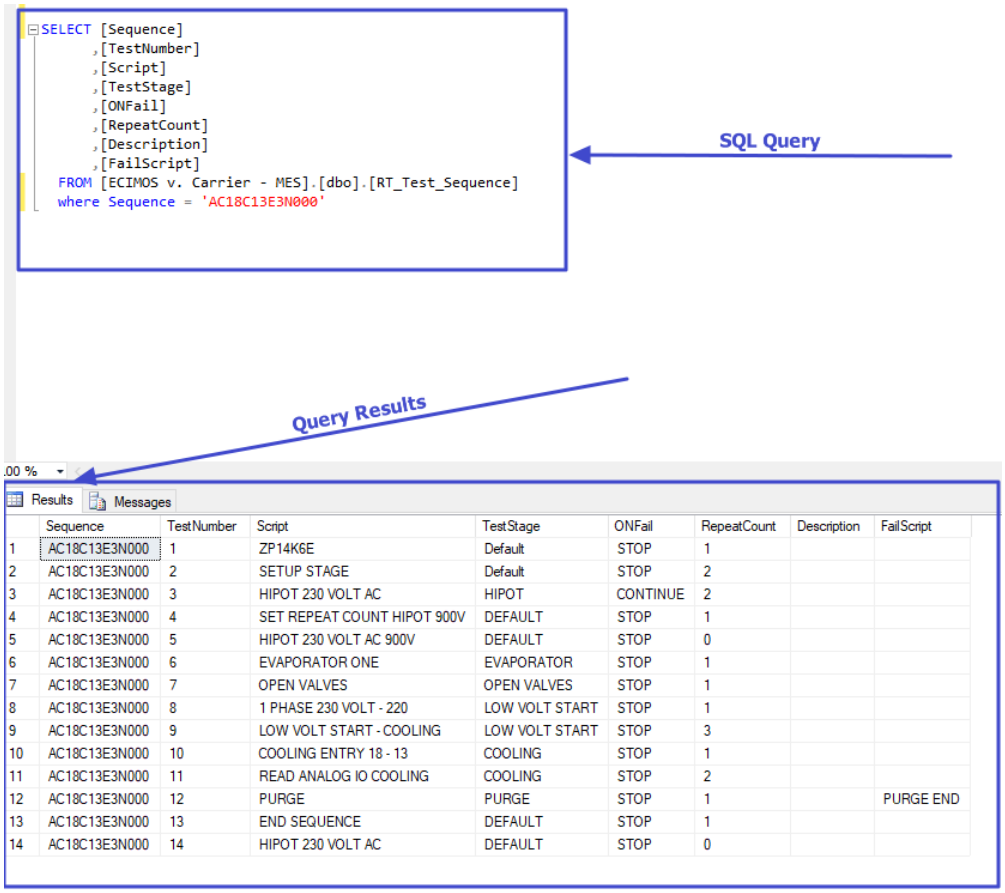
46. To illustrate with an example, this default template can be used as a starting point for creating one's own stored procedure, like for a mathematical function, such as "multiplication." One could use this template to create a stored procedure with "parameter 1" being "val1," a number to multiply by. "Parameter 2" could be "val2," the number to multiply "val1" by. The final stored procedure would multiply "val1" x "val2".

47. Lastly, the code in the screenshot is automatically generated by Microsoft. Even if this code were present in the RES system, automatically-generated code is generally not protectable by copyright and would be filtered out during the filtration step of an Abstraction-Filtration-Comparison analysis.

48. In another confusing step, Mr. Chenault appears to have created his own SQL query for the left ECI side for a comparison on page 16 of his report. Whatever the query is on the left, it does not appear to be present in the ECI database as a stored procedure or view in the materials that have been produced to me, specifically the registered ECI SQL script. The origin of the query is unclear. Without the source of the query on the left, one cannot conclude anything about

similarity with the stored procedure on the right. Further, if the text on the left is code generated by Mr. Chenault or his colleague, it is not appropriate to compare code generated by an expert witness to RES stored procedures or other database scripts as evidence of copying. It is my understanding that if the expression is not present in the registered work, then that expression cannot possibly be infringed upon.

49. As mentioned in paragraph 40 above, Mr. Chenault relies upon a Microsoft Excel spreadsheet as evidence of the presence of what appear to be test procedures and descriptions in the RES database. However, Mr. Chenault does not compare the actual RES database, which is different from and not based upon the C013082.xls spreadsheet, to the ECI database. Mr. Chenault had access to both databases, and yet did not attempt to confirm if the data he relies upon as strong evidence is even present in the RES database tables or software. In fact, on page 10 of his report, he alleges there is similarity between the RT_Test_Sequence table where Sequence = AC18C13E3N000 and the AC18A13E3N tab of the C013082.xls spreadsheet. Mr. Chenault does not include the query or a visual comparison between the query and the spreadsheet tab. The query he described would likely be the query depicted below, with the results included below the query. The SQL query is contained in a blue box with an arrow pointing to it. The results of the SQL query are contained in a blue box with an arrow point to it:

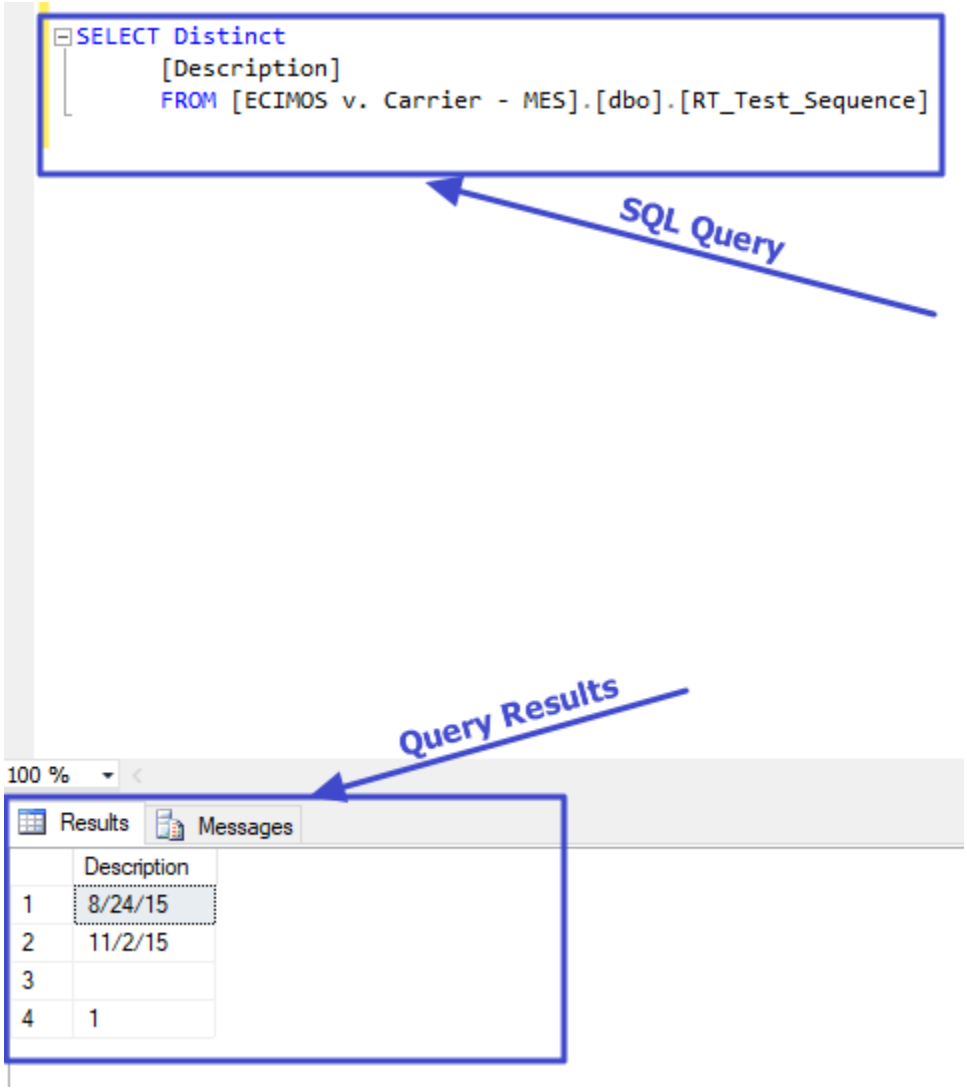


	Sequence	TestNumber	Script	TestStage	ONFail	RepeatCount	Description	FailScript
1	AC18C13E3N000	1	ZP14K6E	Default	STOP	1		
2	AC18C13E3N000	2	SETUP STAGE	Default	STOP	2		
3	AC18C13E3N000	3	HIPOT 230 VOLT AC	HIPOT	CONTINUE	2		
4	AC18C13E3N000	4	SET REPEAT COUNT HIPOT 900V	DEFAULT	STOP	1		
5	AC18C13E3N000	5	HIPOT 230 VOLT AC 900V	DEFAULT	STOP	0		
6	AC18C13E3N000	6	EVAPORATOR ONE	EVAPORATOR	STOP	1		
7	AC18C13E3N000	7	OPEN VALVES	OPEN VALVES	STOP	1		
8	AC18C13E3N000	8	1 PHASE 230 VOLT - 220	LOW VOLT START	STOP	1		
9	AC18C13E3N000	9	LOW VOLT START - COOLING	LOW VOLT START	STOP	3		
10	AC18C13E3N000	10	COOLING ENTRY 18 - 13	COOLING	STOP	1		
11	AC18C13E3N000	11	READ ANALOG IO COOLING	COOLING	STOP	2		
12	AC18C13E3N000	12	PURGE	PURGE	STOP	1		PURGE END
13	AC18C13E3N000	13	END SEQUENCE	DEFAULT	STOP	1		
14	AC18C13E3N000	14	HIPOT 230 VOLT AC	DEFAULT	STOP	0		

50. Note that the description field is empty, and that the results do not appear particularly similar to Exhibit B to Mr. Chenault's report. I have included a print out from the AC18A13E3N tab from the C013082.xls spreadsheet along with the results of this query from Page 10 of Mr. Chenault's report to illustrate the lack of similarity. It is included with my report as Attachment 3.

51. The above example with empty "Description" fields should have been a clue that Mr. Chenault may have made an error in the creation of his spreadsheet on pages 25-27, as all of the "Description" field data is blank in the results of the query on page 10. The query that Mr. Chenault ran according to page 10 demonstrates that no value for the "Description" field is present in the RES database table RT_Test_Sequence for sequence AC18C13E3N000. The "Description" field is blank for all 14 rows. As described above and in Attachment 2, I further

searched to determine if there were *any* values at all present in the "Description" field in the RT_Test_Sequence table. I ran the query below which returned the following results. The table contains only 4 unique descriptions, none of which match the descriptions in "Column H" from Mr. Chenault's spreadsheet on pages 25-27 of his report. Two of the descriptions appear to be dates, one is blank, and the last is simply the number "1." The SQL query is contained in a blue box with an arrow pointing to it. The results of the SQL query are contained in a blue box with an arrow point to it:



52. The above two examples indicate that there is likely a mistake in the spreadsheet from pages 25-27 in Mr. Chenault's report. It is my best guess that Mr. Chenault perhaps compared

data extracted from the ECI database to the data within the C013082.xls spreadsheet. Both of those sources are likely the ECI database, so it is no surprise that the contents are similar. To put it another way, neither the "Carrier Database" rows nor the "ECIMOS" rows in the blue-and-red spreadsheet come from the Carrier RES software or database. Any conclusions based on comparing ECI to ECI cannot serve as evidence that ECI was copied into the RES software or database.

53. To definitely determine if the descriptions from pages 25-27 were contained in the RES database tables or stored procedures, I exported the contents of the RES database tables and stored procedures to text files, indexed the text files using the dtSearch indexing search tool, and searched for each of the unique terms contained on pages 25-27 of Mr. Chenault's report. In performing this analysis, first I extracted each unique description from pages 25-27 of Mr. Chenault's report. The blue-and-red spreadsheet contained 62 unique descriptions in all extracted from the blue-and-red spreadsheet. I then exported the text contents of the 19 RES database tables and 28 database stored procedures to test files using SSMS. Lastly, I indexed the text file contents of the RES database tables and stored procedures using dtSearch, and then searched for each of the 62 descriptions from pages 25-27 of Mr. Chenault's report. I found that *none of the descriptions from pages 25-27 of Mr. Chenault's report appear in the RES database tables or stored procedures.*

54. Mr. Chenault states that there is "no doubt" that the ECI database was copied in the creation of the RES database. He points to only one purported exact match, the MINIPROD table. Firstly, it is my understanding from J.C. Stewart and David Hoal that the "MINIPROD" table was created by Carrier, and not ECI. Therefore, it is unsurprising that the MINIPROD table is similar in both the ECI database and the RES database, as it is a table created by Carrier and not by ECIMOS. Secondly, the table is not an exact match; the table found in the ECI database

contains only 2 fields, while the RES database table contains 3 fields. A date field has been added in the RES database table. Lastly, the data contained in the table is dictated by the literal Serial number and Model number of the Carrier air conditioning units, of 10 characters and 18 characters, respectively. It does not seem reasonable for Carrier be barred from keeping track of their own unit's Serial and Model Numbers, regardless of what software system they choose to run for testing those units.

55. Mr. Chenault states that there is "no doubt" that the ECI database was copied in the creation of the RES database, however he points to only 20 inexact matches on pages 14 and 15, with largely different field names, data types, and field lengths. There are over 1,055 fields in the ECI database tables and 131 in the RES database tables. For two software products that must achieve the same end result, namely testing the same Carrier air conditioners for the same quality control issues, one would expect some similarity between the database fields. The fields singled out by Mr. Chenault would likely be common to software and databases for performing run tests on Carrier A/C units, such as DateRun, TestNo, PassFail, TestDescription, Operator, etc. One would expect this data to be tracked by Carrier in a database *regardless* of the software in use at the plant, as one would expect to track the date a test was run, the test number, whether the test passed or failed, the description, and the person operating the test at the time.

56. Through most of his report, Mr. Chenault does not even compare the actual database tables between ECI and RES. Mr. Chenault instead relies on a spreadsheet attached to an email, which it is my understanding from J.C. Stewart was not even used in the creation of Carrier's RES database tables. It is not clear from Mr. Chenault's report if *any* of the data in the blue-and-red spreadsheet exists in the RES software or database. It is only clear from his report that the attached spreadsheet shares much in common with the ECI software. This is unsurprising, as it is my understanding from J.C. Stewart that the C013082.xls was generated *from* the ECI database,

not the RES database. It is no surprise at all that there is similarity between the ECI database and itself.

57. These above material problems with Mr. Chenault's database analysis render any conclusions based upon the analysis unreliable.

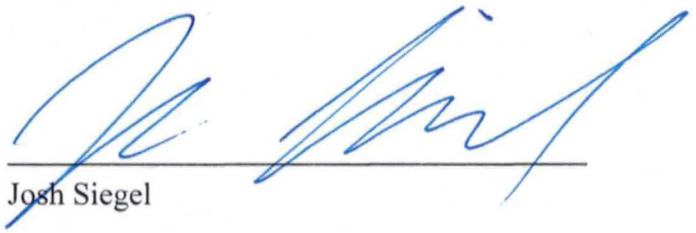
H. MR. CHENAULT DID NOT FIND THAT THE LABVIEW RES SOFTWARE WAS BEING USED TO "TAKE CONTROL" OF OR OTHERWISE MISAPPROPRIATE THE ECI SOFTWARE.

58. Mr. Chenault did not appear to find that the LabVIEW RES software was being used to "take control" of or otherwise misappropriate the ECI software. It was my understanding based on Mr. Chenault's hearing testimony that he would be explaining how Carrier utilized the LabVIEW software to "take control" of the ECI software or APIs. Upon reviewing Mr. Chenault's report, it does not appear that he found any evidence that this process of "taking control" of the ECI software, APIs, or DLLs occurred, or that he found any evidence of the presence of the ECI software hidden inside of the RES software, or that the RES software was utilizing the ECI API's or scripts. APIs would often be found in DLLs which is likely why Mr. Chenault was searching for DLLs utilized by the RES software. Mr. Chenault only found one DLL utilized by the RES Software, the DLL that allows interfacing with the Microsoft Windows operating system.

VII. CONCLUSIONS

59. Based on my years of experience in software, hardware, databases, and intellectual property investigations, I did not see any evidence of direct or indirect copying of the ECI software, in particular the ECI APIs and Scripts, in Carrier's RES software as alleged. Plaintiff has not shown that the developer of the RES software, Amtec, had access to its ECI software source code or APIs. Plaintiff has had the opportunity to identify protectable, alleged-infringing elements within the software, but has not identified a single protectable element that directly or indirectly infringes their software. The new RES software was developed by following the principles of clean room design. The structure, sequence, and organization of the RES database is different from the ECI database. The ECI software cannot have been literally copied, as ECI source code is written in Visual Basic 6 ("VB6"), while the Carrier RES software is designed using a visual programming language, LabVIEW's graphical programming language ("G"). Mr. Chenault has not provided enough information for his analysis to be replicated, validated, independently verified, or relied upon. Further, material issues with Mr. Chenault's report throw his database testimony into question. Mr. Chenault did not find that the LabVIEW RES software was being used to "take control" of or otherwise misappropriate the ECI software. In sum, I have still seen no evidence to support Plaintiff's copyright or misappropriation claims.

I AFFIRM UPON PERSONAL KNOWLEDGE THAT THE CONTENTS OF THE FOREGOING ARE TRUE AND CORRECT.



Josh Siegel

Dated: October 30, 2017

Attachment 1

Mr. Siegel has more than ten years of experience as an IT professional, including ten years of Systems Administration, Security, and Technical Support experience. Since 2011, he has worked as a litigation consultant for DisputeSoft. He is responsible for all of the environments, data, and systems in use at DisputeSoft, including data security and Domain management. He has worked on a variety of software, patent, copyright, and digital forensics cases. He specializes in computer networking, hardware, and infrastructure; intellectual property; and digital forensics.

Prior to starting at DisputeSoft, Mr. Siegel worked as the IT Manager for a property management company, TM Associates Management. There he served as the sole Systems Administrator, IT Director, and IT Support point of contact for a company of over 150 distributed locations and over 100 remote and 20 centralized employees. He was responsible for all of the environments, data, and systems in use at DisputeSoft, including data security and Domain management. Responsibilities also included the installation and maintenance of several antivirus and malware protection software, malware and virus removal for over 100 remote sites, protection of an in-house network against internet threats and vulnerabilities, and hardening servers against potential points of attack.

DISPUTESOFT EXPERIENCE

Copyright Infringement and Trade Secret Misappropriation Disputes

Arkeyo v. Cummins (2017)
In this intellectual property case, assisted counsel with analysis of source code, dlls, and compiled code to determine if trade secrets had been unintentionally disclosed. Provided a declaration to counsel detailing the importance of the Defendant producing its source code repository so that code and development could be reviewed and analyzed for evidence of copying from the Arkeyo software.

Atlantic Technology Enterprises, Inc. v. Lincoln Park Savings Bank & Abacus I.T. Inc. (2017)
In this intellectual property case, reviewed the document production and depositions to determine what material the Plaintiff claimed was its proprietary information. Reviewed Windows Server backups for proprietary information in order to determine if misappropriation occurred. (Ongoing)

Cobra Systems, Inc. v. Unger et al. (2017)
In this intellectual property case, performed source code comparison and reviewed evidence related to both copyright infringement and trade secret misappropriation claims involving software used to print various labels, such as barcodes. Performed an Abstraction-Filtration-Comparison test between two sets of source code in order to demonstrate that the structure, sequence, and organization of the two software programs was substantially similar. Provided a declaration to counsel detailing the evidence of copying between two sets of source code. The declaration also covered the topic of proper clean room design when creating a new product, in order to avoid misappropriation of trade secrets or other protected intellectual property.

ECIMOS, LLC v. Carrier Corporation (2016)
In this intellectual property case, performed source code comparison and reviewed evidence related to both copyright infringement and trade secret misappropriation claims involving software and hardware used for quality testing air conditioning units. Traveled to Collierville, TN to view software in action at the manufacturing plant. Provided a written Declaration to court regarding the difficulty of copying from the source language to the language of the accused product; additionally testified to the same effect on September 1, 2017 at a Preliminary Injunction Hearing. (Ongoing)

T&S Property Management v. Cinc (2016)
In this intellectual property case, performed source code comparisons between two sets of c-sharp source code and databases to determine if any literal copying had occurred between the programs. Reviewed the code to determine whether one software program was likely derived or reverse-engineered from a competing software program, as reverse-engineering was explicitly prohibited by software license.

QueTel: Consulting (2016)
Analyzed different versions of software programs for evidence of the presence of open-source code protected by the LGPL V 3.0 pursuant to a copyright registration and potential trade secret litigation.

Michael Mohr v. Science and Engineering Services, Inc., et al. (2014)
In this intellectual property case, performed extensive source code comparisons, as well as documentary review, towards determining whether literal copying of source code had occurred outside the scope of a licensing agreement. Interviewed several fact witnesses, drafted interrogatories and deposition questions, performed in-depth analysis related to low-level printer commands and the creation of labels for aircraft. Drafted expert report.

Prosuite Software Limited, et al. v. InfoKey Inc., et al. (2013)
In this intellectual property case performed a class-usage and function-call analysis to determine if any code from one source code set was called in new source code.

American Petroleum Institute (2011)
In this copyright infringement case against unknown individuals operating out of China, conducted an investigation to determine the identities of these individuals and determine the extent to which the plaintiff's materials had been pirated. Evaluated websites for potentially infringing content based on PDF standards and sale of copyrighted materials.

Certification Trendz, LTD. v. PassGuide.com et al. (2011)
In this copyright infringement and trademark misappropriation case against unknown individuals operating out of China, conducted an investigation to provide attribution of these individuals and determine the extent to which the plaintiff's materials had been pirated. Used domain tools and other IP address related utilities to find the names and IP addresses of likely culprits of the infringement.

InDyne, Inc. v. Abacus Technology Corporation, et al. (2011)
Performed web server log analysis and environment reconstruction on behalf of the defendant in this trade secret misappropriation case between NASA contractors. Performed forensic keyword search analyses and rebutted opposing expert's claims over infringing content. DisputeSoft demonstrated that the copyright of the misappropriated source code was invalid by showing the source code was a reconstruction of the original work through an analysis of the source code and the deposit materials on file with the U.S. Copyright Office.

Nexus v Kroughly, Limesoft et al. (2011)
In this intellectual property case in the emissions monitoring industry, provided an Affidavit and testimony regarding the nature of compressed "tar.gz" files, restoring backups of source code repositories, and xml configuration settings in source code. Testimony provided at trial highlighted the steps and resources available to the Defendants to determine how to restore a backup of a source code repository to a new location. Testimony also discussed how xml configuration files could be used to validate or verify the origin of accompanying source code produced in the case.

The Studer Group, LLC. V. The Cleveland Clinic Foundation (2011)
In this intellectual property case, worked closely with the client to acquire and differentiate source code repositories of interest for comparison of infringing code. Forensically acquired and compared source code from repositories and rebuilt the source code management system along with the repositories in question. Compared user login and commit date histories between code repositories to show a lack of cross-contamination between projects. Assisted counsel with deposition questions related to the projects and contract in the case.

IT Project Failures

Acumen v. ADS (2016)
In this software failure case regarding the modernization of a Configure-Price-Quote (CPQ) system, analyzed performance benchmarking data, statements of work, software and system requirements, emails and service contracts to determine if the system as delivered met or exceeded the performance requirements as represented by Acumen. Reviewed procedures followed by Acumen in regards to due diligence in vendor selection in the consulting process with ADS.

Federal Signal Technologies, LLC v. Texas Department of Transportation (2014)
In an administrative hearing regarding highway tolling system contract that was terminated for convenience, assisted in a percent-complete analysis of various deliverables specified in the contract. Linked the hardware architecture diagrams to purchased items based on invoices, emails, and the documentary record.

Mary Rutan Hospital v. NextGen Healthcare Information Systems, LLC (2014)
In this software failure case regarding a failed implementation of hospital management software, performed analysis of defect data towards determining if contractual agreements for support had been met. Interviewed several fact witnesses, drafted interrogatories and deposition questions, reviewed production environment to perform validation testing. Restored ticketing systems for review and analysis. Drafted expert report.

AMC Technology, L.L.C. v. Cisco Systems, Inc. (2013)
In a breach of contract case involving software for connecting call center systems to third-party CRM software, reviewed documents, testimony, and source code to reach opinions regarding how effectively the defendants conveyed information to the plaintiff in a timely, accurate manner in adherence to standard industry practice. Analyzed a list of purported defects identified during performance testing to determine how many issues, if any, would have had a material impact on the defendant's ability to ship the software to customers. Drafted expert report.

Arc-Com Fabrics, Inc. v. Third Wave Business Systems, LLC (2013)
In a software project failure case involving the deployment of an SAP Business One system for use by a textiles manufacturer, assisted in drafting an expert report opining on issues of system instability, slow system performance, poor source code quality, and deviations from industry standard practices. Performed reconstruction of production system environments for validation testing.

CedarCrestone, Inc. v. Affiliated Computer Services, LLC, et al. (2013)
In a software project failure case involving a failed PeopleSoft upgrade, conducted analyses of defects recorded in HPQC to determine if material defects in the PeopleSoft software developed by the plaintiff prohibited the project from reaching go-live on time. Performed analysis of defects found in later phases of testing that should not have passed initial Unit testing, had proper testing been performed.

American Orthodontics Corporation v. Epicor Software Corporation (2011)
In this software failure case performed reconstruction of the Epicor ordering system, database environment, and web portal. Assisted in developing a script to simulate large volume orders, then used the script to perform functional testing of said system to prove that orders were delayed and even lost by the software. Performed load-testing analysis to rebut claims that the problems were due to insufficient hardware.

Deluca Enterprises, Inc., et al. v. SAP America Inc., et al. (2011)
In a case alleging overselling and under delivering ERP software, conducted an analysis to determine degrees of similarity between two sets of ARIS business process models based on representations of an SAP integrator that allegedly had reference models applicable to 80 percent of their client's business processes. Rebuilt tape library system and catalog in order to review, analyze and restore relevant data from backup tapes.

Toronto Community Housing Corporation v. Information Systems and Services, Inc. (2011)
In this arbitration brought by a social housing authority against a software vendor before the American Arbitration Association, reconstructed the application environment and systems required for the extensive functional testing needed for this case. Developed and employed a functional testing matrix based on the project's contract and functional specifications, performed functional validation testing, and assisted in the preparation of expert report and hearing materials to establish that the defendant delivered software containing material defects and misrepresented its software's state of readiness during procurement.

GC Services Limited Partnership v. Ontario Systems, LLC, et al. (2010)
In this software project failure case, traveled to Houston, TX and performed forensic acquisition of data as well as extensive analysis and reconstruction of systems from the forensically acquired databases and images. Reconstructed the software environment from the ground up to perform functional testing of the claims in the original pleadings. Reviewed the underlying system architecture and assisted in the preparation of a report evidencing spoliation of the system by the plaintiff. Rebutted allegations of system instability and poor project management through extensive review of case documentation, deposition testimony, and project management standards.

Hudec Dental Associates, Inc. v. Multimedia Dental Systems, Inc. (2010)
Performed extensive analysis of system and audit logs between Dental Practice Management Systems at issue in a software failure case. DisputeSoft demonstrated that the software was materially defective, failed to conform to agreed-upon specifications, did not include promised functionality, contained significant security vulnerabilities that rendered it non-compliant with HIPAA privacy requirements, and was not incapable of supporting the business operations for which it was acquired. Rebutted allegations of ongoing system use past the date of contract termination through extensive audit log analysis and system testing.

Software Patent Infringement Disputes

Uniloc USA, Inc., et al. v. Activision Blizzard, Inc. (2013)
In this patent infringement case, installed, tested activation protocols, captured packet and web traffic for several different versions of antivirus and antimalware software. Assisted in the installation and testing on several different windows platforms in order to verify the process used for software activation.

Apple v. HTC Corporation (2010)
In smartphone patent infringement litigation before the International Trade Commission, reviewed source code for mobile and desktop operating systems related to the patents at issue. Supported invalidity, non-infringement and lack of domestic industry contentions through research, code review and claim charts. Served as a consulting expert.

Computer Forensic Disputes

Edifice Forensic (2017)
Created a forensic image of a laptop. Searched for evidence of drive-wiping tools and recovery of deleted data.

Elalaily Forensic (2017)
Isolated emails sent or received within a certain date range in PST for production.

Thomas Forensic (2017)
Created a forensic image of a laptop and cell phone. Searched for evidence of drive-wiping tools and recovery of deleted email data. Isolated emails sent or received within a certain date range in PST for production.

Welsh Forensic (2017)
Created a forensic image of an android phone and provided text message and MMS analysis for the client in the form of a forensic report.

Emery Federal Credit Union: Forensic Imaging and Analysis (2016)
Imaged a RAID 10 email server and analyzed extracted Exchange server data. Restored data from a proprietary backup format for imaging and analysis; restored and imaged a virtual machine hard drive (VMDK) for inventory and analysis.

State v. [Minor – name withheld] (2016)
Analyzed evidence provided by the State of Maryland to determine if it could be concluded that emails were sent from Defendant to a school administrator. Filed an affidavit to support a motion *in limine* to prevent paper-printout evidence from being used to verify the sender of the email when better evidence was available and email is easily forged. Served as a testifying expert in court, but the case was dismissed in court just prior testimony due to State failing to meet its burden of proof.

State v. Kelvin Sewell (2016)
Created a forensic image from an iPhone 4 and provided text message and MMS analysis for the client in the form of a forensic report.

Elwood Staffing v. Sandler (2016)
Created a forensic image of a laptop computer and searched for evidence of file deletion, as well as searching for evidence that drive-wiping software had been run. Additionally, searched for evidence that company files and data were taken. Provided written forensics report of all findings to the client.

Patriot Metals v. K-fab (2016)
Analyzed windows event logs and IP addresses for evidence of unauthorized remote access to company systems and servers.

ATOS: Forensic Imaging (2016)
Contracted by ATOS to forensically acquire, image, and inventory twelve computers and one USB device. Provided completed acquisitions to ATOS.

Golden v. Gant (2015)
Reviewed three digital audio recording for metadata inconsistencies or other evidence of alteration or tampering.

In re: Vincent L. Abell (2014)
Forensically acquired and imaged a desktop computer hard drive pursuant to a litigation regarding bankruptcy.

Nabijohn v. ITS (NYS Department of Financial Services) (2014)
In this video forensics case performed frame-by-frame analysis of security system footage combined with motion data to conclude whether video files had been altered or footage could conceivably be missing. Drafted expert report.

Pacific Bioscience v Nutra Luxe MD (2012)
Assisted as a neutral expert in forensic imagining, analysis, and e-discovery regarding emails from a MacBook. Forensically extracted emails from different sources and loaded into a Concordance database.

General Electric Company v. Mitsubishi Heavy Industries, LTD., et al. (2011)
Assisted in developing an electronic discovery application used to review terabytes of backup data and prepare secure reports for counsel without directly viewing confidential data. The application reduced electronic document review costs by orders of magnitude and countered opposing counsel's claims of undue burden to produce relevant documents. Created extensive test data sets designed to simulate the environment of an enterprise system unrolled from tape backups and perform load testing on the application.

General Electric Company, et al. v. Thomas Wilkins (2011)
In this patent infringement case traveled to Kansas City, MO for inspection and inventory of legacy tape collection. Rebuilt legacy tape drive library systems for data recovery and searches for certain keywords related to the patent and defendant.

Declarations, Affidavits, Reports, and Testimony

Arkeyo v. Cummins

Declaration: Declaration signed April 4, 2017 detailing the importance of the production of the source code repository for expert review

Cobra Systems, Inc. v. Unger et al.

Declaration: Declaration signed March 20, 2017 detailing the AFC test performed as well as evidence of copying between software programs

Nexus v Kroughly, Limesoft et al.

***Affidavit*:** Affidavit signed February 15, 2017 detailing how to extract and restore data from an SVN repository, as well as the importance of specific xml files in validating the origin of produced source code.

Testimony: Testimony provided at a hearing on July 13, 2017 covering the topics explained in the Affidavit, as well as touching briefly on clean room design.

ECIMOS v. Carrier

Declaration: Declaration signed December 22, 2016 in rebuttal to Plaintiff's claims, as well as detailing the challenges of comparing text-based source code to graphical source code.

Testimony: Testimony provided at a September 1, 2017 Preliminary Injunction Hearing reiterating points made in the Declaration, as well as touching on elements of proper clean room design and details of the source code review.

Declaration: Declaration signed October 13, 2017 in support of Carrier's memorandum in opposition to Plaintiff's motion to reopen proof, detailing material issues with the opposing expert's report.

State v. [Minor – name withheld]

Affidavit: Affidavit signed November 14, 2016 detailing the steps one could take in order to authenticate that an email was sent from a specific device and received by the recipient, and that paper printouts, in lieu of any other qualifying information, were not sufficient to authenticate an email.

EDUCATION AND EMPLOYMENT HISTORY

Education

Bachelor of Arts, Computer Science
Certificate in Bioinformatics and Modeling
The Wesleyan University, Middletown, CT

Employment History

IT Litigation Consultant and Systems Administrator, DisputeSoft (Jan. 2011–Present)
Forensically acquired, rebuilt, and tested numerous system environments. Performed various analyses on data extracted from a variety of database types and systems. Drafted expert reports and aided in formulating expert witness opinions for cases. Performed root cause analyses related to system outages pursuant to SLAs and MSA requirements. Built and administered a domain from the ground up, including Active Directory, Group policy, VPN, telephony, wired and wireless networking, Disaster Recovery and backup strategy, antivirus and SharePoint solutions. Managed updates, backups and recovery for all server data and systems, as well as system security for an office of networked and computers. Managed all hardware capacity planning, implementation, maintenance and support, as well as supporting and maintaining software licenses and warranties. Certified as an EnCase Certified Examiner for computer forensics since October, 2012.

IT Manager and Systems Administrator, TM Associates Management, Inc (Oct. 2005-Jan. 2011)

Managed updates, backups, and recovery for all server data and systems. Maintained system security, Active Directory and domain services for an office network of computers as well as for over 150 remote locations, including protection against and removal of viruses and malware. Maintained critical system application servers in OS/400 as well as Windows environments. Provided system and application support to over 100 users for a custom-based property management software as well as Windows operating systems. Created and customized a number of Crystal Reports and administered the database for the proprietary software solution. Managed all hardware capacity planning, implementation, maintenance and support, as well as supporting and maintaining software licenses and warranties.

Certifications

Microsoft Certified Systems Administrator for Server 2003
Microsoft Certified Systems Engineer for Server 2003
Microsoft Certified Technology Specialist
Microsoft Certified Professional
EnCase Certified Examiner

Attachment 2

```
SELECT Distinct
       [Description]
       FROM [ECIMOS v. Carrier - MES].[dbo].[RT_Test_Sequence]
```

SQL Query

Query Results

100 %

Results | Messages

	Description
1	8/24/15
2	11/2/15
3	
4	1

```
SELECT DISTINCT [Description]
  FROM [ECIMOS v. Carrier - MES].[dbo].[RT_User]
```

SQL Query

Query Results

00 %

Results | Messages

	Description
1	Administrator
2	Engineer
3	Operator
4	Quality Auditor

```
SELECT Distinct [StepDescription]
  FROM [ECIMOS v. Carrier_MES].[dbo].[RT_Test_Script]
```

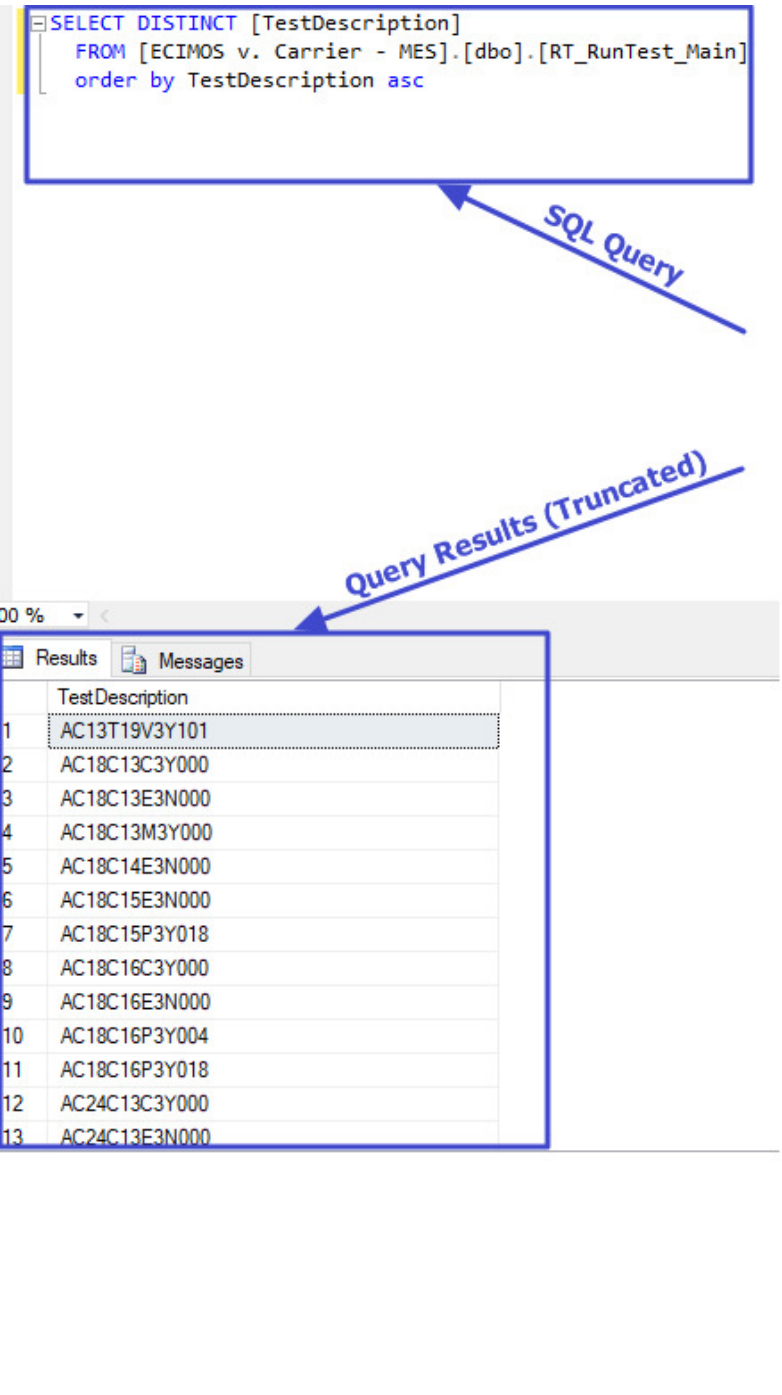
SQL Query

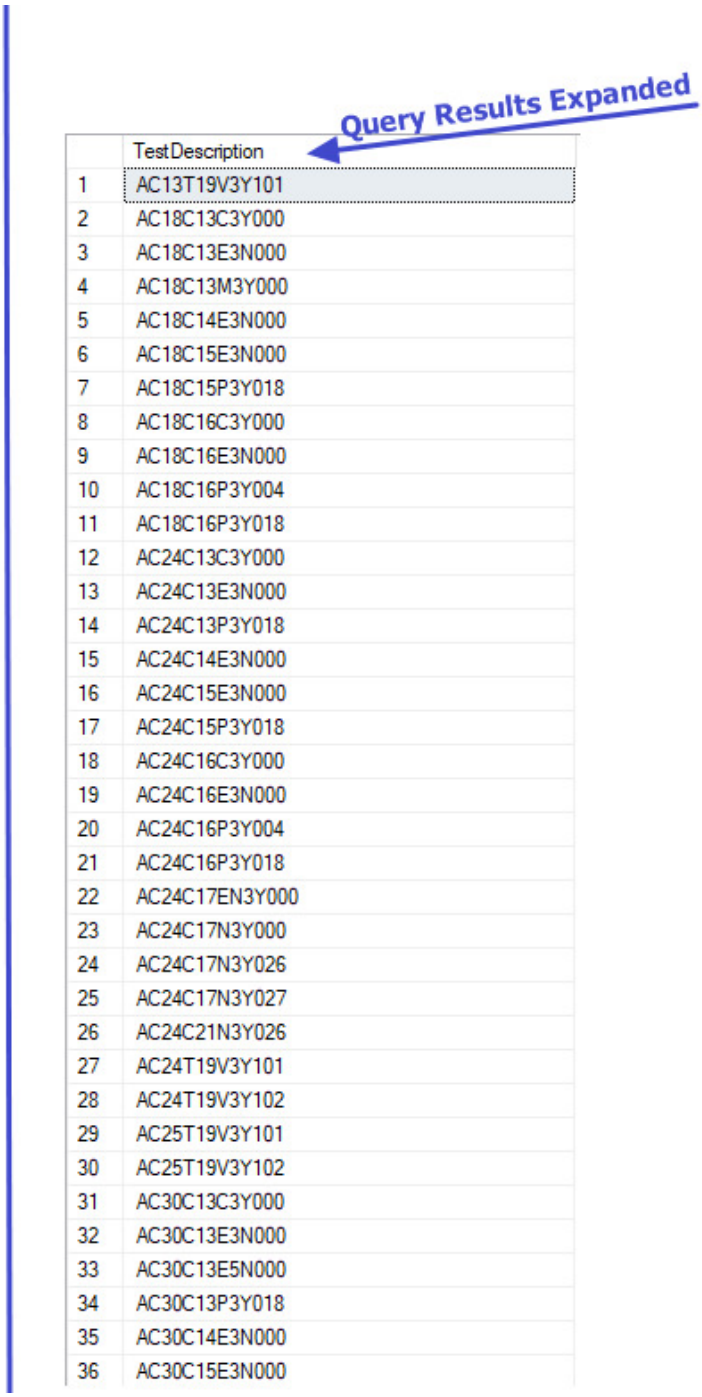
100 %

Results | Messages

	StepDescription
1	VIBRATION SENSOR NOT CONNECTED
2	L1 CURRENT
3	MODEL PLUG
4	FAN SENSOR NOT CONNECTED
5	BOARD ERRORS
6	HOME SENSORS
7	BOARD COMMUNICATION
8	WINDING CURRENT
9	`
10	L1 CURRENT PEAK
11	COMPRESSOR NOT RUNNING
12	4-WAY VALVE DID NOT SHIFT
13	FAN CLAMP
14	HIPOT
15	VIBRATION
16	FAN PROBE
17	FAN SAIL SWITCH
18	
19	W2
20	PURGE
21	TEMP
22	MOISTURE
23	DE-ENERGIZE RELAY
24	ENERGIZE RELAY
25	MISC
26	VAPOR PRESSURE
27	DC VOLTS
28	FAN CURRENT
29	WINDING CLAMP
30	LIQUID PRESSURE
31	VIBRATION SENSOR

Query Results


SELECT DISTINCT [TestDescription]
FROM [ECIMOS v. Carrier - MES].[dbo].[RT_RunTest_Main]
order by TestDescription asc
SQL Query
Query Results (Truncated)
00 %
Results
Messages
TestDescription
1 AC13T19V3Y101
2 AC18C13C3Y000
3 AC18C13E3N000
4 AC18C13M3Y000
5 AC18C14E3N000
6 AC18C15E3N000
7 AC18C15P3Y018
8 AC18C16C3Y000
9 AC18C16E3N000
10 AC18C16P3Y004
11 AC18C16P3Y018
12 AC24C13C3Y000
13 AC24C13E3N000


Query Results Expanded
TestDescription
1 AC13T19V3Y101
2 AC18C13C3Y000
3 AC18C13E3N000
4 AC18C13M3Y000
5 AC18C14E3N000
6 AC18C15E3N000
7 AC18C15P3Y018
8 AC18C16C3Y000
9 AC18C16E3N000
10 AC18C16P3Y004
11 AC18C16P3Y018
12 AC24C13C3Y000
13 AC24C13E3N000
14 AC24C13P3Y018
15 AC24C14E3N000
16 AC24C15E3N000
17 AC24C15P3Y018
18 AC24C16C3Y000
19 AC24C16E3N000
20 AC24C16P3Y004
21 AC24C16P3Y018
22 AC24C17EN3Y000
23 AC24C17N3Y000
24 AC24C17N3Y026
25 AC24C17N3Y027
26 AC24C21N3Y026
27 AC24T19V3Y101
28 AC24T19V3Y102
29 AC25T19V3Y101
30 AC25T19V3Y102
31 AC30C13C3Y000
32 AC30C13E3N000
33 AC30C13E5N000
34 AC30C13P3Y018
35 AC30C14E3N000
36 AC30C15E3N000

37	AC30C15P3Y018
38	AC30C16C3Y000
39	AC30C16E3N000
40	AC30C16P3Y004
41	AC30C16P3Y018
42	AC36C13E1N000
43	AC36C13E5N000
44	AC36C13E6N000
45	AC36C13M3Y000
46	AC36C15P3Y018
47	AC36C16C3Y000
48	AC36C16E3N000
49	AC36C16P3Y004
50	AC36C16P3Y018
51	AC36C17EN3Y000
52	AC36C17N3Y000
53	AC36C17N3Y026
54	AC36C17N3Y027
55	AC36C18N3Y026
56	AC36C21N3Y026
57	AC36L13C3Y000
58	AC36L13E3N000
59	AC36L14E3N000
60	AC36L15E3N000
61	AC36L15P3Y018
62	AC36L16E3N000
63	AC36T19V3Y101
64	AC36T19V3Y101-QCTEST
65	AC36T19V3Y102
66	AC37L16E3N000
67	AC37T19V3Y101
68	AC37T19V3Y102
69	AC42C13C3Y000
70	AC42C13E3N000
71	AC42C13E5N000
72	AC42C13E6N000
73	AC42C13M3Y000
74	AC42C13M5Y000
75	AC42C14E3N000
76	AC42C15E3N000
77	AC42C15P3Y018
78	AC42C16C3Y000
79	AC42C16E3N000
80	AC42C16P3Y004
81	AC42C16P3Y018
82	AC42L16E3N000
83	AC43C16E3N000
84	AC48C13C3Y000
85	AC48C13E5N000
86	AC48C13E6N000
87	AC48C13M3Y000
88	AC48C14E3N000
89	AC48C15P3Y018
90	AC48C16C3Y000
91	AC48C16E3N000
92	AC48C16P3Y004
93	AC48C16P3Y018
94	AC48C17EN3Y000
95	AC48C17N3Y000
96	AC48C17N3Y026
97	AC48C17N3Y027
98	AC48C20N3Y026
99	AC48C21N3Y026
100	AC48L13E3N000
101	AC48L14E3N000
102	AC48L15E3N000
103	AC48L15P3Y018
104	AC48T19V3Y101
105	AC48T19V3Y101-QCTEST
106	AC48T19V3Y102
107	AC49C16E3N000
108	AC49T19V3Y101
109	AC49T19V3Y102
110	AC54C16E3N000
111	AC60C13C3Y000
112	AC60C13E1N000
113	AC60C13E5N000
114	AC60C13E6N000
115	AC60C13M3Y000
116	AC60C13M5Y000
117	AC60C14E3N000
118	AC60C15P3Y018
119	AC60C16C3Y000
120	AC60C16E3D000
121	AC60C16E3N000
122	AC60C16E3N000QCTEST
123	AC60C16P3Y004
124	AC60C16P3Y018
125	AC60C17EN3Y000
126	AC60C17N3Y000
127	AC60C17N3Y026
128	AC60C17N3Y027
129	AC60C20N3Y026
130	AC60C21N3Y026
131	AC60L13E3N000
132	AC60L14E3N000
133	AC60L15E3N000
134	AC60T19V3Y101
135	AC60T19V3Y102
136	AC61C16E3D000
137	HP13T18V3Y101
138	HP18C14E3Y007
139	HP18C14P3Y024
140	HP18C15C3Y008
141	HP18C15E3Y001
142	HP18C15P3Y022
143	HP18C15P3Y024
144	HP18C16C3Y008

145	HP18C16P3Y024
146	HP24C14E3Y001
147	HP24C14E3Y007
148	HP24C14P3Y024
149	HP24C15C3Y008
150	HP24C15E3Y001
151	HP24C15P3Y022
152	HP24C15P3Y024
153	HP24C16E3Y001
154	HP24C16EN3Y008
155	HP24C16N3Y008
156	HP24C16N3Y026
157	HP24C16N3Y027
158	HP24C16P3Y024
159	HP24C17EN3Y008
160	HP24C20V3Y049
161	HP24T18V3Y101
162	HP24T18V3Y101-QCTEST
163	HP24T18V3Y102
164	HP25T18V3Y101
165	HP25T18V3Y102
166	HP30C14E3Y007
167	HP30C14P3Y024
168	HP30C15C3Y008
169	HP30C15E3Y001
170	HP30C15P3Y022
171	HP30C15P3Y024
172	HP30C16P3Y024
173	HP36C15C3Y008
174	HP36C15E3Y001
175	HP36C15P3Y022
176	HP36C15P3Y024
177	HP36C16N3Y008
178	HP36C16N3Y026
179	HP36C16N3Y027
180	HP36C17EN3Y008
181	HP36C20V3Y049
182	HP36L14E3Y007
183	HP36L14E5Y007
184	HP36L14E6Y007
185	HP36L14P3Y024
186	HP36L16E3Y001
187	HP36L16P3Y024
188	HP36T18V3Y101
189	HP36T18V3Y102
190	HP37C15E3Y001
191	HP37L15E3Y001
192	HP37T18V3Y101
193	HP37T18V3Y102
194	HP42C14E3Y007
195	HP42C14P3Y024
196	HP42C15C3Y008
197	HP42C15E3Y001
198	HP42C15P3Y022
199	HP42C15P3Y024
200	HP42C16C3Y010
201	HP42C16E3D009
202	HP42C16P3D051
203	HP42C16P3Y051
204	HP42L14E3Y007
205	HP42L14P3Y024
206	HP48C14E3Y007
207	HP48C14P3Y024
208	HP48C15C3Y008
209	HP48C15E3Y001
210	HP48C15P3Y022
211	HP48C15P3Y024
212	HP48C16C3Y008
213	HP48C16E3Y001
214	HP48C16EN3Y008
215	HP48C16N3Y008
216	HP48C16N3Y026
217	HP48C16N3Y027
218	HP48C17EN3Y008
219	HP48C20V3Y049
220	HP48L14E3Y007
221	HP48L14E5Y007
222	HP48L14E6Y007
223	HP48T18V3Y101
224	HP48T18V3Y101 QC TES
225	HP48T18V3Y102
226	HP60C14E3Y007
227	HP60C14E5Y007
228	HP60C14E6Y007
229	HP60C15C3Y008
230	HP60C15E3Y001
231	HP60C15P3Y022
232	HP60C15P3Y024
233	HP60C16C3D010
234	HP60C16E3D009
235	HP60C16E3Y009
236	HP60C16N3Y008
237	HP60C16N3Y026
238	HP60C16N3Y027
239	HP60C16N3Y052
240	HP60C17EN3Y008
241	HP60C20V3Y049
242	HP60T18V3Y101
243	HP60T18V3Y101-QCTEST
244	HP60T18V3Y102
245	MAINTENANCE01

Attachment 3

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Results Messages

	Sequence	TestNumber	Script	TestStage	ONFail	RepeatCount	Description	FailScript
1	AC18C13E3N000	1	ZP14K6E	Default	STOP	1		
2	AC18C13E3N000	2	SETUP STAGE	Default	STOP	2		
3	AC18C13E3N000	3	HIPOT 230 VOLT AC	HIPOT	CONTINUE	2		
4	AC18C13E3N000	4	SET REPEAT COUNT HIPOT 900V	DEFAULT	STOP	1		
5	AC18C13E3N000	5	HIPOT 230 VOLT AC 900V	DEFAULT	STOP	0		
6	AC18C13E3N000	6	EVAPORATOR ONE	EVAPORATOR	STOP	1		
7	AC18C13E3N000	7	OPEN VALVES	OPEN VALVES	STOP	1		
8	AC18C13E3N000	8	1 PHASE 230 VOLT - 220	LOW VOLT START	STOP	1		
9	AC18C13E3N000	9	LOW VOLT START - COOLING	LOW VOLT START	STOP	3		
10	AC18C13E3N000	10	COOLING ENTRY 18 - 13	COOLING	STOP	1		
11	AC18C13E3N000	11	READ ANALOG IO COOLING	COOLING	STOP	2		
12	AC18C13E3N000	12	PURGE	PURGE	STOP	1		PURGE END
13	AC18C13E3N000	13	END SEQUENCE	DEFAULT	STOP	1		
14	AC18C13E3N000	14	HIPOT 230 VOLT AC	DEFAULT	STOP	0		

ENTRY SINGLE PHASE AC								
Module Name	Test Step Name	SPARAM	Param1	Param2	Param3	Param4	TestDesc	Verification
Start1Phase	SETUP ELECTRICAL		1	225	230	0	Phase, Low Param, High Param, Board Type	
HIPOT SINGLE PHASE ENTRY AC	HIPOT MODE AC		0	0	0	0	Sets hipot to AC mode	
HIPOT SINGLE PHASE ENTRY AC	HIPOT VOLTS		1.75	0	0	0	Set hipot test voltage	
HIPOT SINGLE PHASE ENTRY AC	HIPOT RAMP TIME		1	0	0	0	Time to ramp to hipot voltage	
HIPOT SINGLE PHASE ENTRY AC	HIPOT TEST TIME		2	0	0	0	Time to dwell at hipot voltage	
HIPOT SINGLE PHASE ENTRY AC	HIPOT CURRENT LIMITS		2	40	0	0	Set limits for hipot leakage current	
HIPOT SINGLE PHASE ENTRY AC	HIPOT ARC LIMIT		5	0	0	0	Sets hipot arc limit	
HIPOT SINGLE PHASE ENTRY AC	TURN ON SPEEDUP		0	0	0	0	Apply speedup	
HIPOT SINGLE PHASE ENTRY AC	ENERGIZE REVERSING VALVE		0	0	0	0	Connect R to O	
HIPOT SINGLE PHASE ENTRY AC	ENERGIZE CONTACTOR		0	0	0	0	Connect R to Y	
HIPOT SINGLE PHASE ENTRY AC	ENERGIZE HIPOT CONTACTOR		0	0	0	0	Energize Hipot Contactor	
HIPOT SINGLE PHASE ENTRY AC	TIME DELAY		1	0	0	0	Time Delay Hipot Test	
HIPOT SINGLE PHASE ENTRY AC	TURN OFF SPEEDUP		0	0	0	0	Remove speedup	
HIPOT SINGLE PHASE ENTRY AC	TIME DELAY		3	0	0	0	Time Delay Hipot Test	
HIPOT SINGLE PHASE ENTRY AC	START HIPOT TEST		1	2	0	0	Start hipot test with above parameters	
HIPOT SINGLE PHASE ENTRY AC	DE-ENERGIZE HIPOT CONTACTOR		0	0	0	0	De-Energize Hipot Contactor	
EVAPORATOR 18	PURGE EVAPORATOR		95	110	0	0	Wait For Evap Purge	
EVAPORATOR 18	TURN OFF EVAPORATOR CIRCUIT 30		0	0	0	0	Close Evaporator Valve 30	
EVAPORATOR 18	TURN OFF EVAPORATOR CIRCUIT 48		0	0	0	0	Close Evaporator Valve 48	
EVAPORATOR 18	TURN ON EVAP BLOWER		0	0	0	0	Turn on evaporator blower	
EVAPORATOR 18	TURN ON TXV BYPASS		0	0	0	0	Open TXV Bypass Valve	
EVAPORATOR 18	TURN ON EQUALIZATION VALVE		0	0	0	0	Open eqaulization Valve	
EVAPORATOR 18	TIME DELAY		1	0	0	0	Wait on gauges to Stabilize	
OPENVALVES	TURN ON VAPOR VALVE		0	0	0	0	Open suction line valve	
OPENVALVES	TURN ON LIQUID VALVE		0	0	0	0	Open discharge line valve	
OPENVALVES	TIME DELAY		2	0	0	0	Time Delay Open Valves	
OPENVALVES	WAIT FOR PRESSURE EQUALIZATION		90	6	0	0	Wait for discharge and suction to equalize	
OPENVALVES	TIME DELAY		3	0	0	0	Wait for pressure check	
OPENVALVES	CHECK LIQUID PRESSURE LIQUID CL		65	300	0	0	Verify discharge pressure	
OPENVALVES	CHECK VAPOR PRESSURE CL		60	300	0	0	Verify suction pressure	
OPENVALVES	CAPTURE DISCHARGE TEMPERATURE		0	0	0	0	Gets temperature of evaporator before testing	
LOW VOLT START ENTRY A	APPLY LOW VOLTS		0	0	0	0	Set volts for low voltage start	
LOW VOLT START ENTRY A	TURN OFF EQUALIZATION VALVE		0	0	0	0	Close quick equalization valve	
LOW VOLT START ENTRY A	TURN OFF TXV BYPASS		0	0	0	0	Close TXV bypass valve	
LOW VOLT START ENTRY A	TIME DELAY		4	0	0	0	Time Delay CheckAmpProbes	
LOW VOLT START ENTRY A	CHECK FAN CURRENT		0.2	3.5	4	0	Verify Fan Current clamp is connected	
LOW VOLT START ENTRY A	CHECK START WINDING CURRENT		2	15	5	0	Verify Start Winding clamp is connected	
STEADY STATE SINGLE PHASE	VERIFY COMPRESSOR STARTED		5	120	3	0	Verify unit started and is running	

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STEADY STATE SINGLE PHASE	TIME DELAY		5	0	0	0	Time Delay Steady State	
STEADY STATE SINGLE PHASE	LOG L1 CURRENT STEADY STATE		0.1	30	0	0	Log L1 Current during SS	
STEADY STATE SINGLE PHASE	LOG START WINDING CURRENT STEADY STATE		2	15	0	0	Log Start Winding Amps during SS	
STEADY STATE SINGLE PHASE	LOG FAN CURRENT STEADY STATE		0.1	3.2	0	0	Log Fan Current in SS	
STEADY STATE SINGLE PHASE	SET RUN VOLTS		0	0	0	0	Set voltage for unit run	
STEADY STATE SINGLE PHASE	TIME DELAY		3	0	0	0	Time Delay SS	
Cooling ZP16	TIME DELAY		120	0	0	0	Cooling ZP24	
Cooling ZP16	LOG LIQUID PRESSURE COOLING		160	300	0	0	Log liquid pressure in cooling	
Cooling ZP16	LOG VAPOR PRESSURE COOLING		100	160	0	0	Log vapor pressure in cooling	
Cooling ZP16	LOG LI CURRENT COOLING		3	5	0	0	Log L1 Current in Cooling	
Cooling ZP16	LOG STARTWINDING CURRENT COOLING		3	4.5	0	0	Log Start Winding Amps during cooling	
Cooling ZP16	LOG FAN CURRENT		0.3	0.9	0	0	Log Fan Current in cooling	
Cooling ZP16	LOG MOISTURE		-50	50	0	0	Log moisture content of refrigerant	
Cooling ZP16	LOG VIBRATION COOLING		0.015	0.5	3	0	Log Unit Vibration in cooling	
Cooling ZP16	VERIFY FAN IS RUNNING		3	0	0	0	Verify fan Sail Switch On	
DELTATEMPCOOLING	LOG TXV PRESSURE COOLING		-600	600	0	0	TXV Cooling	
DELTATEMPCOOLING	LOG TEMPERATURE CHANGE COOLING		-70	1	0	0	Delta Change Cooling	
DELTATEMPCOOLING	LOG DELTA TEMPERATURE COOLING		-50	10	0	0	Log Delta Temperature in Cooling	
PURGE EVAPORATOR ENTRY	TURN OFF LIQUID VALVE		0	0	0	0	Close discharge line valve	
PURGE EVAPORATOR ENTRY	PUMP REFRIGERANT INTO COIL		100	90	10	90	Wait for refrigerant to purge from Evap	
PURGE EVAPORATOR ENTRY	TURN OFF VAPOR VALVE		0	0	0	0	Close suction line valve	
PURGE EVAPORATOR ENTRY	TIME DELAY		1	0	0	0	Generic Time Delay	
PURGE EVAPORATOR ENTRY	DE-ENERGIZE CONTACTOR		0	0	0	0	Disconnect R and Y	
PURGE EVAPORATOR ENTRY	DE-ENERGIZE REVERSING VALVE		0	0	0	0	Disconnect R and O	
PURGE EVAPORATOR ENTRY	TIME DELAY		2	0	0	0	Time Delay For Fan Off	
PURGE EVAPORATOR ENTRY	VERIFY FAN IS OFF		-1	0.25	0	0	Fan is Still Running	
PURGE EVAPORATOR ENTRY	TURN OFF VOLTS		0	0	0	0	Remove variac voltage	
LVHIPOT230AC	CUSTTAG1		0	0	0	0	Cust tag for troubleshooting	
LVHIPOT230AC	HIPOT MODE AC		0	0	0	0	Sets hipot to AC mode	
LVHIPOT230AC	LOW VOLT HIPOT		0.8	0	0	0	Set hipot test voltage	
LVHIPOT230AC	HIPOT RAMP TIME		3	0	0	0	Time to ramp to hipot voltage	
LVHIPOT230AC	HIPOT TEST TIME		2	0	0	0	Time to dwell at hipot voltage	
LVHIPOT230AC	HIPOT CURRENT LIMITS		2	40	0	0	Set Low/High limits for hipot leakage current	
LVHIPOT230AC	HIPOT ARC LIMIT		5	0	0	0	Sets hipot arc limit failure	
LVHIPOT230AC	ENERGIZE CONTACTOR		0	0	0	0	Connect R to Y	
LVHIPOT230AC	ENERGIZE REVERSING VALVE		0	0	0	0	Connect R to O	
LVHIPOT230AC	ENERGIZE HIPOT CONTACTOR		0	0	0	0	Energize Hipot Contactor	

ACT8A13E3N

LVHIPOT230AC	TIME DELAY		1	0	0	0	Generic Time Delay	
LVHIPOT230AC	START HIPOT TEST		1	2	0	0	Start hipot test with above parameters	
LVHIPOT230AC	DE-ENERGIZE HIPOT CONTACTOR		0	0	0	0	De-Energize Hipot Contactor	
LVHIPOT230AC	CUSTTAG		0	0	0	0	Cust tag for troubleshooting	

LVHIPOT230AC
This is a 900 Volt hipot module that is ran if the unit fails hipot. If it passed the 900 volt test the unit is allowed to run but has to run a normal 1750 volt hipot at the end.